

**CLAIMS**

What is claimed is:

- 1 1. A method, comprising:
  - 2 identifying a combination of fields in a header of an internet protocol version 4
  - 3 (hereinafter IPv4) packet, wherein the combination is dynamically modifiable;
  - 4 and
  - 5 utilizing the combination of fields to classify the IPv4 packet.
- 1 2. The method according to claim 1, further comprising:
  - 3 a. constructing a key according to information in a key construction register;
  - 4 b. identifying a tag that corresponds to the key from a table of key-tag entries in
  - 5 a memory device; and
  - 6 c. inserting the tag in the header of IPv4 packet in accordance to information in
  - 7 a tag insertion register.
- 1 3. The method according to claim 2, wherein the information in the key
- 2 construction register indicates a retrieval location in the header of IPv4 packet

3 and a number of bits from the retrieval location to consider in constructing the  
4 key.

1 4. The method according to claim 2, wherein the information in the tag insertion  
2 register indicates a number of bits to retrieve from the tag and an insertion  
3 location in the header of IPv4 packet to insert the tag.

1 5. A broadband engine, comprising:

2 a. a transceiver module; and

3 b. a lookup module, coupled to an external processor via an external  
4 processor interface, an external content adjustable memory and the  
5 transceiver module, further including:

6 a processing core to classify an internet protocol version 4

7 (hereinafter IPv4) packet by utilizing a dynamically modifiable

8 combination of fields in a header of the IPv4 packet.

1 6. The broadband engine according to claim 5, the transceiver module further

2 a. collects a portion of incoming packets; and

3 b. appends control information to the collected portion.

- 1 7. The broadband engine according to claim 5, the lookup module further  
2 comprising:
- 3 a. a plurality of registers to contain key construction information and tag  
4 insertion information from the external central processing unit; and
- 5 b. the processing core to construct a key according to the key construction  
6 information, retrieve a tag that corresponds to the key from the external  
7 content adjustable memory and insert the tag in a header of one of the  
8 packets based on the tag insertion information.
- 1 8. The broadband engine according to claim 7, wherein the key construction  
2 information further comprises:
- 3 a retrieval location in the header of IPv4 packet and a number of bits from the  
4 retrieval location to consider in constructing the key.
- 1 9. The broadband engine according to claim 7, wherein the tag insertion  
2 information further comprises:
- 3 a number of bits to retrieve from the tag and an insertion location in the header  
4 of IPv4 packet to insert the tag.
- 1 10. A line card, comprising:

- 2 an input/output interface;
- 3 a switch fabric interface to communicate with a switch fabric; and
- 4 a broadband engine, coupled to the input/output interface and the switch fabric
- 5 interface, further including:
- 6 a. a transceiver module to receive a plurality of packets from the input/output
- 7 interface; and
- 8 b. a lookup module, coupled to an external content adjustable memory, the
- 9 transceiver module and an external processor, further including:
- 10 a processing core to classify an internet protocol version 4
- 11 (hereinafter IPv4) packet by utilizing a dynamically modifiable
- 12 combination of fields in a header of the IPv4 packet.
- 13 11. The line card according to claim 10, the transceiver module further
- 14 a. collects a portion of incoming packets; and
- 15 b. appends control information to the collected portion.
- 1 12. The line card according to claim 10, the lookup module further comprising:
- 2 a. a plurality of registers to contain key construction information and tag
- 3 insertion information from the external central processing unit; and
- 4 b. the processing core to construct a key according to the key construction
- 5 information, retrieve a tag that corresponds to the key from the external

6 content adjustable memory and insert the tag in a header of one of the  
7 packets based on the tag insertion information.

1 13. The line card according to claim 12, wherein the key construction  
2 information further comprises:  
3 a retrieval location in the header of IPv4 packet and a number of bits from the  
4 retrieval location to consider in constructing the key.

1 14. The line card according to claim 12, wherein the tag insertion information  
2 further comprises:  
3 a number of bits to retrieve from the tag and an insertion location in the header  
4 of IPv4 packet to insert the tag.

1 15. A communication system, comprising:  
2 a. a switch fabric;  
3 b. a main processing engine with an processor; and  
4 c. a line card, coupled to the switch fabric via a switch fabric interface, further  
5 including:  
6 an input/output interface;

a broadband engine, coupled to the input/output interface and the switch fabric interface, further comprising:

- i. a transceiver module to receive a plurality of packets from the input/output interface; and
- ii. a lookup module, coupled to an external content adjustable memory, the transceiver module and the processor, further including:
  - a processing core to classify an internet protocol version 4 (hereinafter IPv4) packet by utilizing a dynamically modifiable combination of fields in a header of the IPv4 packet.

16. The communication system according to claim 15, the transceiver module further

- a. collects a portion of incoming packets; and
- b. appends control information to the collected portion.

17. The communication system according to claim 15, the lookup module further comprising:

- a. a plurality of registers to contain key construction information and tag insertion information from the external central processing unit; and

- 5       b. the processing core to construct a key according to the key construction  
6       information, retrieve a tag that corresponds to the key from the external  
7       content adjustable memory and insert the tag in a header of one of the  
8       packets based on the tag insertion information.

- 1   18.   The communication system according to claim 17, wherein the key  
2       construction information further comprises:  
3       a retrieval location in the header of IPv4 packet and a number of bits from the  
4       retrieval location to consider in constructing the key.

- 1   19.   The communication system according to claim 17, wherein the tag insertion  
2       information further comprises:  
3       a number of bits to retrieve from the tag and an insertion location in the header  
4       of IPv4 packet to insert the tag.